PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

4/8

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Applicant's or agent's file reference see form PCT/ISA/220	Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet) **FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2004/041476	08.12.2004	21.01.2004

International Patent Classification (IPC) or both national classification and IPC
H04L27/34, H04L25/06, H04L27/38

Applicant
QUALCOMM INCORPORATED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized Officer

Agudo Cortada, E

Telephone No. +49 89 2399-7111

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2004/041476

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ in written format

      ☐ in computer readable form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in computer readable form.

      ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. II Priority

1. ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43*bis*.1 and 64.1) is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-34
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-34
Industrial applicability (IA)	Yes: Claims	1-34
	No: Claims	

2. Citations and explanations

see separate sheet

V. Reasoned Statement under Rule 66.2(a)(ii) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

I

The following document is referenced for the first time in this written opinion; the numbering will be adhered to in the rest of the procedure:

D1: US-A-5 966 412
D2: US 2002/181604 A1
D3: KANNAN RAMCHANDRAN: "MULTIRESOLUTION BROADCAST FOR DIGITAL HDTV USING JOINT SOURCE/ CHANNEL CODING" IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 11, no. 1, January 1993 (1993-01), pages 6-22, XP000377993 ISSN: 0733-8716
D4: EP-A-1 361 686

II

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 12, 16, 20, 27, 31 does not involve an inventive step in the sense of Article 33(3) PCT.

1.1 Document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document) a method of performing data detection in a wireless communication system comprising:
- decoding the code bits of a first data stream based on the received symbols for a data transmission (see column 5, lines 11-26 and figure 1, item 146).
-estimating interference due to the first data stream (see column 6, lines 17-20 and figure, item 160);
-decoding the code bits of a second data stream based on the received symbols and the estimated interference (see column 6, lines 14-15);

The subject-matter of claim 1 therefore differs from this known D1 in that the claim defines the steps of deriving log-likelihood ratios for the code bits of the first and the

second data streams and that the log-likelihood ratios of the second code bits are based on the log-likelihood ratios of the first code bits and the estimated interference.

This determination of the log-likelihood ratios is a customary step when decoding the code bits employing soft-decoding, a technique well-known in the art and which is furthermore mentioned in D1 (see column 5, lines 11-15). The skilled person, when trying to implement an alternative decoding method as proposed in D1 employing soft-decoding, would derive the log-likelihood ratios for the code bits of the first and the second data streams.

Regarding the fact that in the claim it is defined that the log-likelihood ratios of the second code bits are based on the log-likelihood ratios of the first code bits and the estimated interference, it must be first of all noticed that, since the estimated interference is calculated based on the decoded code bits of the first data stream and for this decoding, when using soft decision, the log-likelihood ratios of the first code bits has been employed, the fact of employing the estimated interference to derive the log-likelihood ratios of the second data stream, as would occur when employing the teachings of D1 using soft-decoding, would necessarily imply that these log-likelihood ratios of the second data stream are also based on the log-likelihood ratios of the first data stream.

Thus, by introducing soft decoding to the method disclosed in D1, the skilled person would, without the use of any inventive activity, run accross a method falling within the scope of claim 1.

1.2 The same argument concerning the lack of inventive step of claim 1 can be made on the basis of either of the documents D2-D4 (see passages cited in the International search report).

1.3 The subject-matter of claim 20 describes the same subject-matter as claim 1 with minor variations of wording and introducing the step of "deriving symbol estimates for the first data stream based on either the received symbols or the LLRs for the code bits of the first data stream". This feature is known from D1 (see column 6, lines 17-20 and figure, item 160).

The subject-matter of claims 12, 16, 27 and 31 describes the same subject-matter as claim 1 in terms of the corresponding apparatus features with minor variotions of

wording.

Therefore, the reasoning in point 1.1 above also aplies to claims 12, 16, 20, 27 and 31, which consequently do not involve an inventive step when departing from D1 (or either of the documents D2-D4).

2. Dependent claims 2-11, 13-15, 17-26, 28-30 and 32-34 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.

In particular, the subject-matter of claims 2, 4, 6, 10, 13, 17, 22, 28, 32 are directly derivable from the aforementioned documents D1-D4, whereas the features of the rest of the claims constitute minor constructional variations whithout inventive merit.